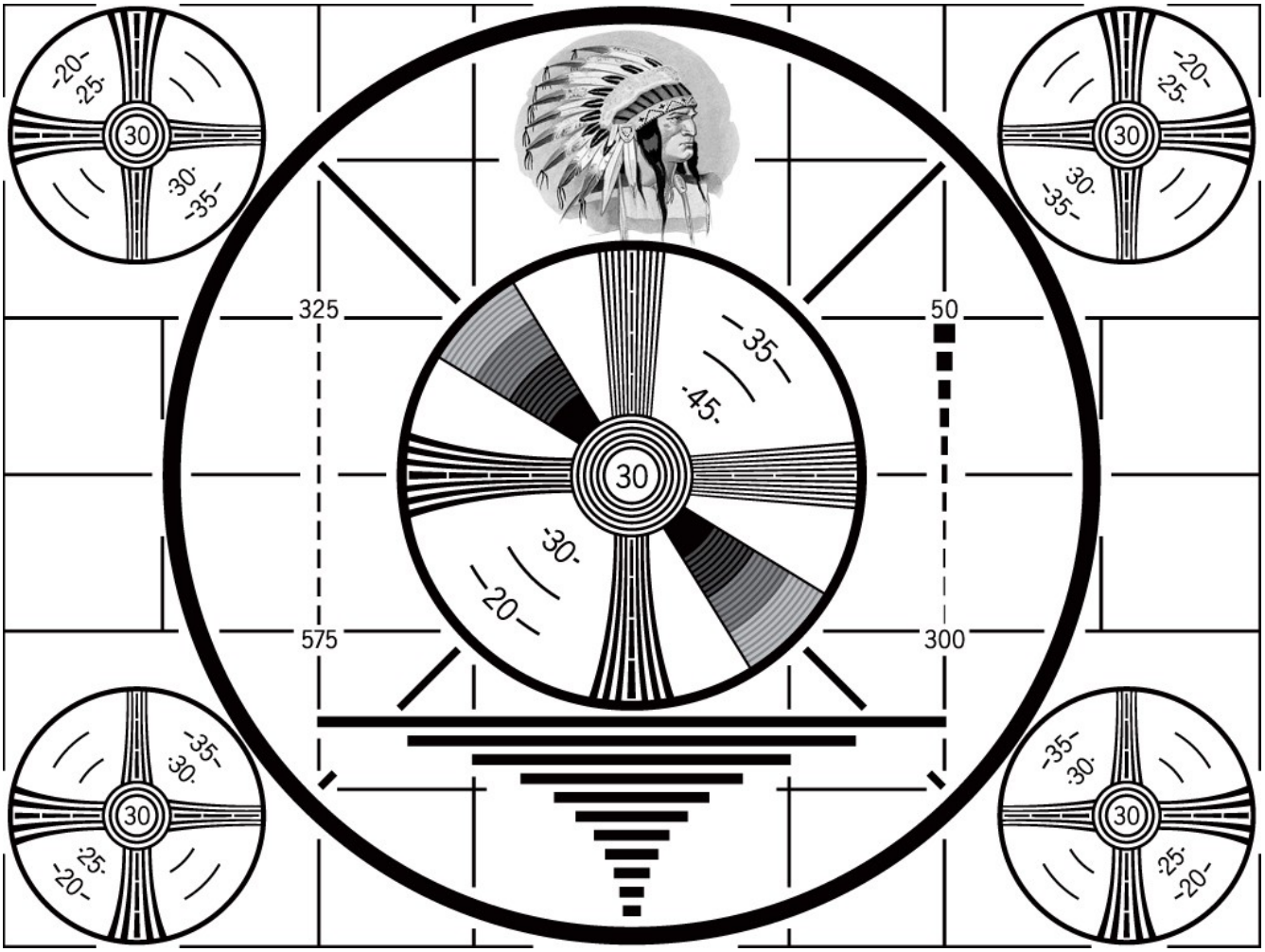
Internet Broadcasters Information Handbook

Fifth Edition



Written By

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www.ScenicRadio.Com

Relaxing Entertainment for the World

www.BroadcastingWorld.Com

Global Broadcast Information Portal

About The Author

David Childers is the Content Manager for the Global Broadcasting portal www.BroadcastingWorld.com. He is very active in the Internet broadcast industry and has written numerous guides and a book about this growing technological field. He is also the webmaster of www.ScenicRadio.com, the global destination for relaxing entertainment.

Mr. Childers' work has been cited in several national and International publications, including these:

Five Essays on Copyright In the Digital Era
Turre Publishing

Research On High-Profile Digital Video Production
Digital Content Association of Japan

Video Podcasting in Perspective: The History, Technology, Aesthetics and Instructional Uses of a New Medium
Journal of Educational Technology Systems

Video Podcasting: When, Where and How it's Currently used for Instruction
The National Convention of the Association for Educational Communications and Technology

IP Packet Charging Model For Multimedia Services
National University of Rwanda

Preservation of audiovisual mediums: Problems and challenges
Platform for Archiving and Preservation of Art on Electronic and Digital Media

P2P Technology Trend and Application to Home Network
Electronics and Telecommunications Research Institute Journal

Peer To Peer Computing - The Evolution of a Disruptive Technology
Idea Group Publishing

Peer-to-Peer Systems and Applications
Lecture Notes In Computer Science
Springer Berlin / Heidelberg

Feedback

Please feel free to contact the author if you have any questions or comments. Your feedback is greatly appreciated.

You can contact the author here: www.KL7AF.com

Foreword

Welcome to the Fifth Edition of The Streaming Media Handbook.

The Internet is becoming a universal source for multimedia entertainment and information. The increased availability of hand held and mobile electronic devices has dramatically extended the reach of the Internet. It is important to understand and make use of this far reaching medium.

I would like to thank Scarlet Coker for providing assistance with the editing of the guide, and James Davey at Broadcasting World for allowing me the opportunity to create this handbook.

It is my sincere hope that the reader finds this handbook a valuable resource.

David Childers

October 2011

Posveèeno Neži Vidmar

Dum vita est spes est.

All of the books in the world contain no more information than is broadcast as video in a single large American city in a single year. Not all bits have equal value.

Dr. Carl Sagan

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Changes

Renamed - Additional Information to Additional Internet Broadcasting Guides

Removed - Promoting Your Online Radio or Television Station

Removed - The Art Of Generating Revenue for Internet Broadcasting Stations

Removed - The Internet Broadcast Station Audience

Added - Introduction

Added - Multimedia Software

Added - Additional Reading

Added - Additional Resources

Introduction

Internet broadcasting is rapidly becoming a driving force in multimedia content delivery for personal and business use. The ability to access multimedia has transitioned from the desktop computer, to the laptop, to the smart phone, and now to the tablet. Any size group, business or country can make their presence known and make their content available to a global audience. Internet broadcasting provides a extremely low cost solution for delivering multimedia content on a global basis. There are no geographic boundaries that can prevent the distribution of content, only the hardware constraints of the broadcaster or the end user can limit access to the content.

Delivery of multimedia over the Internet can provide a rich variety of content in many formats. This multimedia can be delivered as live or recorded material. Recorded or on demand content can be accessed at any time without limitation.

On demand video and audio consumption on the Internet has grown at a rapid pace. The popularity of YouTube, Netflix, Hulu and iTunes indicates that this market continues to grow. Live video and audio consumption also continues to grow rapidly. This is reflected by audience traffic generated by SHOUTcast Radio, Icecast Radio, I Heart Radio, sports and news events.

Consumer electronic companies are recognizing this shift in multimedia content consumption and are providing alternative devices and methods to access multimedia content on the Internet. These devices can be used to access a combination of both audio and video content.

Multimedia can now be received and consumed at home, at work or on the go. End users are no longer required to be desk bound or near a wifi outlet to access content. The only limitation now is the signal coverage for 3G and 4G data network providers.

It's important to remain knowledgeable of the available technology for content delivery and understand the principals that support it. Networking, computers and the Internet are constantly changing at a rapid pace. All three technologies interact with each other and provide the ability to deliver the multimedia content. It is also important to stay current with the technology of multimedia encoding and distribution, which changes on a regular basis as well.

What Is Internet Broadcasting

Streaming multimedia on the Internet requires the conversion of video and audio into a compressed digital format then distributing the data through computer networks. This compressed data can be easily delivered using computer networks because of its smaller size. The video or audio can be live or recorded content, and can be continuously streamed or delivered as on demand content.

Internet streaming is similar to standard radio and television broadcasting. Software is used to convert video and audio into a format that is suitable for delivery using a computer network. Radio and television stations use special hardware to convert video and audio data into a format suitable for broadcasting. Special computer network transport protocols enable the delivery of multimedia content to the end user (audience members) versus using broadcast transmitters to send the video or audio content to individual radio and television sets.

The first step in the Internet streaming process is to digitally compress the audio or video content. This is required to conserve bandwidth that is used for the delivery of the content. Specially developed software applications, called codecs, are used to compress the video or audio data. Codecs use mathematical algorithms to compress the data. Most codecs use a method of data compression known as lossy data compression. This method allows the compression of the content without losing the quality of the original video or audio content. Advanced codecs require large amounts of computer resources for high definition video and audio data compression. A balance must be established between the compression quality, bandwidth consumed and computer resources used. This balance ensures a quality listening and viewing experience for everyone.

The next step is to distribute the encoded video and audio content. Special server software is required for the continuous distribution of multimedia content. This specialized software can be installed and run on various computer operating systems including: Windows, Linux and Macintosh; in addition to several other computer operating systems. Individual files can be distributed using on demand content delivery, without the need for specialized server software. On demand content can be hosted using a standard website account.

The final step is to prepare the compressed content for delivery. The method of data delivery used to transport the content via computer networks is determined by several factors that include: software used for the compression of the audio or video data, architecture of the computer network used for content delivery and end user requirements. Delivery of this data over computer networks uses special software or hardware instructions to route the video or audio content to the end user. Each computer network transport protocol has its own unique characteristics that make it applicable in specific situations.

No broadcast license or technical certification is required for Internet streaming, unlike a standard radio or television broadcast station. Standard radio and television broadcast stations are required to have a broadcast license and certified broadcast engineers. The only requirements for Internet video streaming are: specialized data delivery server software, special audio and video encoding software and large amounts of bandwidth. Bandwidth is required for the delivery of the video and audio content to the end user.

All multimedia content is subject to applicable intellectual property regulations. These regulations differ from country to country; however the general rule for audio and video content is the station originating the Internet stream must own, or have a license to distribute material that is covered under copyright regulations. Content that has been released under creative commons, public domain or has fallen out of copyright protection is not subject to intellectual property regulations and can be streamed with no special content licensing requirements.

Internet Broadcasting Software Guide

This is a technical assessment of current Internet broadcasting software that is available.

Icecast

Icecast supports audio streaming.
Icecast supports video streaming.

Multimedia encoder (Free)
www.videolan.org
Multimedia server (Free)
www.icecast.org

Software support
Icecast Streaming Handbook
www.scribd.com/doc/18175026/Icecast-Streaming-Handbook
www.icecast.org/docs.php

www.videolan.org/streaming-features.html
www.videolan.org/doc/streaming-howto/en/ch02.html
www.videolan.org/doc/streaming-howto/en/ch03.html

Icecast does support Windows Media embedded Active X player for MP3 format.
(Java Vorbis audio player)
www.javazoom.net/jlgui/jlgui.html
Flash stream player (MP3 audio format.)
www.draftlight.net/dnex/mp3player/minicaster
Multimedia playback supported on most operating systems.

ITheora is a PHP script allowing you to broadcast ogg/theora/vorbis video and audio files. (Free)
www.itheora.org

Ezstream is a command line source client for Icecast media streaming servers. (Free)
www.icecast.org/ezstream.php

Visionair Theora video streaming software. (Free)
visonair.cravecreate.com/software.php

SHOUTcast

Shoutcast supports audio streaming.
Shoutcast supports video streaming.

Multimedia encoder (Free)
www.shoutcast.com/download
nullsoft.com/nsv/
Multimedia server (Free)
www.shoutcast.com/download

Software support
SHOUTcast Audio And Video Streaming Guide
www.scribd.com/doc/19781412/SHOUTcast-Audio-And-Video-Streaming-Guide
SHOUTcast Streaming - Best of Technical Support
www.scribd.com/doc/24188933/SHOUTcast-Streaming-Best-of-Tech-Support
www.shoutcast.com/support
www.scvi.net

Shoutcast does support Windows Media embedded Active X player for MP3 format.
(Java MP3 player)
www.javazoom.net/jlgui/jlgui.html
Flash stream player (MP3 audio format.)
www.draftlight.net/dnex/mp3player/minicaster
Multimedia playback supported on most operating systems.

Adobe Flash

Adobe Flash supports audio streaming.
Adobe Flash supports video streaming.

Multimedia encoder (Free)
www.adobe.com/products/flashmediaserver/flashmediaencoder
Open source server (Free)
www.osflash.org/red5
Multimedia server (Paid)
www.adobe.com/products/flashmediaserver
Multimedia server (Paid)
www.wowzamedia.com/

Adobe Flash supports embedded Active X player.
Multimedia playback supported on most operating systems.

Windows Media

Supports audio streaming.
Supports video streaming.

Multimedia encoder (Free)
www.microsoft.com/windows/windowsmedia/forpros/encoder/default.mspx
Multimedia server (Paid)
www.microsoft.com/windowsserver2003/default.mspx
Software support
www.microsoft.com/windows/windowsmedia/knowledgecenter/helpdocs.aspx

Windows Media supports embedded Active X player.
Multimedia playback supported on most operating systems.

QuickTime Streaming

QuickTime supports audio streaming.
QuickTime supports video streaming.

Multimedia encoder (Free) (Mac operating system.)
www.apple.com/quicktime
Multimedia server (Paid) (Mac operating system.)
www.apple.com/server/macosx
Open Source multimedia server (Various operating systems.)
developer.apple.com/opensource/server/streaming/index.html
Installing Darwin Open Source multimedia server on Fedora Linux platform
wiki.gandi.net/en/hosting/using-linux/tutorials/fedora/darwinstreaming

QuickTime DOES NOT support embedded Active X player.
Multimedia playback supported on most operating systems.

Silverlight

Silverlight supports audio streaming.
Silverlight supports video streaming.

Multimedia encoder (Paid)
www.microsoft.com/expression/products/overview.aspx?key=encoder
Multimedia server (Paid)
www.microsoft.com/windowsserver2003/default.mspx

Silverlight DOES NOT support embedded Active X player.
Multimedia playback supported on most operating systems.

RealMedia

RealMedia supports audio streaming.
RealMedia supports video streaming.

Multimedia encoder (Both free & paid)
www.realnetworks.com/products/producer
Multimedia server (Paid)
www.realnetworks.com/products/media_delivery.html

RealMedia DOES NOT support embedded Active X player.
Multimedia playback supported on most operating systems.

SteamCast

SteamCast supports audio streaming.
SteamCast supports video streaming.

Steamcast is a streaming media server which has the capabilities of both SHOUTcast and Icecast2 with some extra features. This software and directory supports the following file formats: Mp3, Ogg, NSV, NSA(AAC) and aacPlus. (Free)
www.steamcast.com

PicoStreamer

PicoStreamer supports audio streaming.
PicoStreamer supports video streaming.

PicoStreamer is a set of scripts that allows you to use a standard web hosting account with Perl/PHP for streaming true real LIVE web station. PicoStreamer supports Flash, SHOUTcast and Icecast streaming. (Free)
www.vinz486.com

Pirate Radio

Pirate Radio supports audio streaming.
Pirate Radio DOES NOT support video streaming.

Multimedia encoder (Paid)
www.clipstream.com/purchase/pirateradio
No remote server available.

Pirate Radio DOES NOT support embedded Active X player.
Playback supported on Windows operating system only.
(Special multimedia software required - free download.)
www.pirateradio.com/downloads

Peer-To-Peer Streaming

Goalbit

Goalbit supports audio streaming.
Goalbit supports video streaming.

Goalbit is an Open Source Peer To Peer multimedia broadcasting system that is based on the BitTorrent protocol. The encoder, server and multimedia player are bundled in the same software package.

Download (Free)
goalbit.sourceforge.net/downloads.html
Users guide
goalbit.sourceforge.net/documentation.html

Goalbit supports most multimedia stream types.

Goalbit DOES NOT support embedded Active X player.
Software installation supported on most operating systems.

Why Are Multimedia Codecs Important for Internet Broadcasting

Multimedia encoding is the most important technical consideration for Internet broadcasting. It is necessary to compress the content into a manageable amount of data because multimedia production creates a large quantity of digital data. Without reducing the size of the multimedia content, the uncompressed content would require very large amounts of network resources for content distribution and electronic storage. This would effectively limit the ability to transport or store the multimedia data and prevent the content from being delivered in a cost effective manner.

The goal of multimedia encoding is to achieve the greatest amount of data compression while retaining the best visual or audio quality as well as clarity of the original content. Specialized software applications called codecs are used to encode / compress the multimedia content. This technical term stands for coder / decoder or compressor / decompresser. Codecs use complex mathematical algorithms and specialized processes to compress the data, which allows the video content to retain its quality and clarity. Most codecs use algorithms that are based on lossy data compression, which enables multimedia compression by slightly altering the content to be encoded. This results in the encoded video being slightly different from the original content, but still providing quality visual representation.

There are many available codecs that can be used for encoding multimedia content for broadcasting, with each one having unique properties. Some of these are proprietary and may require the purchase of a end user's license, and some are open source that do not require the purchase of a end user's license. Technical limitations for the use of these codecs may include the following: specific operating system requirements, encoder bandwidth limitations, encoder system resource use or end user playback software requirements.

Both proprietary and open source codecs offer many unique features, with the most important feature being the ability to provide quality multimedia presentations at low bandwidth and the ease of use for end users. Excessive bandwidth consumption can severely limit the ability to deliver the multimedia content to a wide audience and complicated software set up for audience participants will dissuade people from viewing the multimedia content.

Understanding the process of multimedia encoding and multimedia compression is important. Choosing the appropriate codec for an Internet broadcast will ensure the production of quality multimedia that will be available for the audience receiving the broadcast. It is also important to have adequate network and computer resources to support the requirements for your broadcast.

Audio Codecs Available for Internet Broadcasting

Open Source Codecs

Vorbis is a digital audio codec developed by the Xiph organization. This codec uses a derivative of lossy data compression and is based on Modified Discrete Cosine Transform (MDCT). Vorbis belongs to a group of codecs that use MDCT, which includes Windows Media Audio and Advanced Audio Coding. MDCT prevents the introduction of artifacts within the audio during the process of encoding or decoding. The process of data quantization used by this codec is also unique to its functionality.

FLAC (Free Lossless Audio Codec) is an audio codec similar to MP3, but uses lossless compression technology. This codec uses linear prediction to convert the audio samples to a series of small, uncorrelated numbers (known as the residual), which are stored efficiently using Golomb-Rice coding. It also uses run-length encoding for blocks of identical samples, such as silent passages.

Proprietary Codecs

MP3 is a proprietary digital audio codec that was commercially implemented by the Fraunhofer Society. This codec uses a derivative of lossy data compression and is based on Perceptual Coding for encoding and decoding of audio multimedia. This codec is also known as MPEG-1 Audio Layer 3.

Advanced Audio Coding (AAC) is a proprietary digital audio codec developed by a coalition of media companies. This codec uses a derivative of lossy data compression and is based on Modified Discrete Cosine Transform (MDCT). AAC belongs to a group of codecs that use MDCT, which includes Windows Media Audio and Vorbis. MDCT prevents the introduction of artifacts within the audio during the process of encoding or decoding. The process of data quantization used by this codec is also unique to its functionality. AAC was developed as a successor to the MP3 audio codec. This codec is also known as MPEG-4 AAC.

High-Efficiency Advanced Audio Coding (AAC+) is a proprietary digital audio codec developed by the Coding Technologies company. This codec uses a derivative of lossy data compression and uses Spectral Band Replication to improve the audio compression performance of the codec. This codec is also known as HE-AAC.

Windows Media Audio (WMA) is a proprietary digital audio codec developed by Microsoft. This codec uses a derivative of lossy data compression and is based on Modified Discrete Cosine Transform (MDCT). WMA belongs to a group of codecs that use MDCT, which includes Advanced Audio Coding and Vorbis. MDCT prevents the introduction of artifacts within the audio during the process of encoding or decoding. The process of data quantization used by this codec is also unique to its functionality.

RealAudio (RA) is a proprietary digital audio codec developed by RealMedia. This codec uses a derivative of lossy data compression. RealAudio 10 is the current implementation and is based on the industry standard MPEG-4 / HE-AAC .

Video Codecs Available for Internet Broadcasting

Open Source Codecs

VP8 is based on decomposition of frames into square subblocks of pixels, prediction of such subblocks using previously constructed blocks, and adjustment of such predictions (as well as synthesis of unpredicted blocks) using a DCT (Discrete Cosine Transform).
www.webmproject.org/media/pdf/vp8_bitstream.pdf
* VP8 was created to replace the VP7 video codec.

WebM is a video format that was created to use the VP8 video codec and the Vorbis audio codec. It is uses a variation of the Matroska container format and complies with the HTML 5 embedded video standard. This format is supported by Firefox and Opera, Chrome web browsers, in addition to Adobe, Google and many other content publishers.
www.webmproject.org
webmproject.blogspot.com

Theora is derivative of VP3. Theora aims at improving the original VP3 implementation through optimizing the encoder software and actual codec structure.
www.theora.org
www.theora.org/news

VP3 uses a multi-step approach to video encoding. These steps include Discrete Cosine Transforms, Quantization, Run Length Encoding, Zigzag Ordering, Differential, Motion Compensation, Entropy Coding, Variable Length Run Length Booleans, YUV Colorpsace and Frame Type. This codec also uses an unusual feature that consists of encoding data from bottom to top, rather than from top to bottom.

Dirac uses Wavelet Compression instead of Discrete Cosine Transforms as the basis for its compression algorithm. It promises results comparable to or better than current proprietary codecs such as H.264.
www.diracvideo.org

Proprietary Codecs

H.264 is known as MPEG-4 Part 10 or MPEG-4 AVC. It uses block-orientation and motion-estimation to achieve superior compression performance when compared to other video codecs.

VP7 was developed as a successor to VP6. Some of the major improvements of VP7 included mode encoding, use of alternate reference frames for quality and temporal scalability.

VP6 was developed as a successor to VP5. Some of the key milestones of VP6 included support of multi-pass encoding, improved error recovery and direct access to the data reconstruction buffer.

Windows Media Video is based on MPEG-4 AVC. The current version of WMV has achieved several improvements that include native support for interlaced video, non-square pixels, and frame interpolation.

Real Video uses very accurate motion modeling, proprietary spatial pixel prediction methods, context adaptive entropy coding, psycho-visually tuned segmentation, filtering schemes, rate-distortion optimized encoding algorithms and two-pass encoding.

Why Are Streaming Protocols Important for Internet Broadcasting

Multimedia broadcasting on the Internet requires the use of specialized protocols to overcome the inconsistencies of data transfers. These protocols control how the data is delivered over the Internet. The multimedia broadcast must be received at specific times and in the proper sequential order to ensure a quality viewing / listening experience. Multimedia received late or out of order causes the stream to drop off or stutter.

Both the multimedia encoding and streaming server software must be capable of supporting the same streaming protocol. Both the streaming and multimedia player software must be capable of also supporting the same streaming protocol to ensure that the audience members will also be able to receive the streamed multimedia content. The selection of the streaming protocol used for individual Internet broadcasts is determined by the method used to encode the multimedia and the software used for the multimedia distribution server.

Without the use of specialized protocols for multimedia content delivery, video and audio distribution would be very complicated and costly. The quality of the streamed content would be marginal and not well suited for continuous multimedia distribution. This would limit the ability to deliver high quality multimedia to large groups of audiences.

Common Protocols Used for Internet Broadcasting

SHOUTcast was developed by Justin Frankel and is a modification of HTTP, which is used to distribute web page data over the Internet. Shoutcast uses special meta tag data that is placed within HTTP communications headers. TCP is used to transport the data.

Icecast was developed by the Xiph open media organization and is a modification of HTTP, which is used to distribute web page data over the Internet. Icecast is similar to Shoutcast and uses special meta tag data that is placed within HTTP communications headers. TCP is used to transport the data.

Hyper Text Transport Protocol (HTTP) was developed by the Internet Engineering Task Force and provides a definitive architecture for data communications between a client and server. TCP is used to transport the data.

Real Time Streaming Protocol (RTSP) was developed by the Internet Engineering Task Force and functions similarly to HTTP. RTSP differs from regular HTTP content delivery by requiring a permanent data connection between clients that are exchanging data. RTSP uses a message ID to monitor each data connection between clients, so that no permanent TCP connection is required. RTSP also allows users to control the basic functions of a media server; such as starting, pausing or stopping the delivery of the content. TCP is used to transport the data.

Real Time Transport Protocol (RTP) was developed by the Internet Engineering Task Force. RTP provides identification and sequential ordering of data bits as well as monitoring the delivery of multimedia content. RTP is less susceptible to the loss of data being sent via computer networks, but it is very sensitive to data delay that can be caused by network irregularities. RTP does not provide the ability to guarantee content delivery. UDP is used to transport the data.

Real Data Transport (RDT) was developed by RealNetworks as a proprietary alternative to RTP. RDT is commonly used in conjunction with a control protocol such as RTSP. UDP is used to transport the data.

Microsoft Media Server (MMSH) was developed by Microsoft as a proprietary protocol that was used with the Windows Media Server. MMSH was replaced by RTSP, but is still used as a fall back alternative. Either TCP or UDP can be used to transport the multimedia data.

These are the data protocols that are used to deliver the packets of information over the Internet.

Transport Control Protocol (TCP) was developed by the Defense Advanced Research Projects Administration and is one of the primary methods for controlling data exchange over computer networks. TCP guarantees the reliability and order of data by requiring acknowledgment for receiving data from clients before more is sent. The use of TCP will result in a large communications overhead.

User Datagram Protocol (UDP) was developed by David Reed and is one of the primary methods for controlling data exchange over computer networks. UDP does not require the verification of data, which does not provide guaranteed delivery of the data or proper ordering of the data. This greatly reduces overall communications overhead. It provides a greater data delivery speed and is much more efficient.

Common Distribution Methods for Internet Broadcasting

Unicast distribution enables the exchange of data on a computer network; between an individual sending address and an individual receiving address. Each data exchange between different computer addresses requires its own individual communication thread from the sender to the receiver. This allows the distribution of identical data, from a central source, to all remote destinations. This method, however, requires adequate bandwidth to facilitate total concurrent data transmissions.

Multicast distribution enables the delivery of a single data transmission to numerous destination network addresses simultaneously. This is achieved by the use of special hardware and software within a unique network environment, which creates exact copies of the distributed data. This allows data distribution from one source to numerous recipients using negligible bandwidth.

Peer-to-Peer distribution enables the delivery of multimedia content to numerous destination network addresses using specialized software, without using large amounts of bandwidth. It is similar to the deployment of Multicast, but requires no special hardware or network environments.

Virtual Local Area Network (VLAN) is a specialized software application that enables remotely located network addresses to be grouped together and exchange data virtually, as if they were connected to the same physical network. A Virtual Local Area Network has the same technical characteristics as a physical Local Area Network, but allows the remote addresses to be grouped together regardless of their location.

A VLAN can provide the proper network environment for Multicast streaming.

Public Domain / Creative Commons Content

You may use audio or video multimedia content that does not require royalty payments for streaming or distribution.

The license that this multimedia content falls into is covered under three categories:

Multimedia specifically placed into Public Domain by the creator
All Intellectual Property rights have been waived and the material is released to the public for any commercial or noncommercial use. The material can be mixed with other content as well, however the derived work must also be placed into Public Domain.

Multimedia that has been placed into Public Domain because the Intellectual Property rights assigned to that specific content have expired
The material is released to the public for any commercial or non commercial use. The material can be mixed with other content as well, however the derived work must also be placed into Public Domain. (Rules, governing expiration of Intellectual Property rights vary with individual nations.)

Multimedia specifically placed under Creative Commons licensing
Creative Commons licenses differ from Public Domain, because the Creative Common license grants the creator specific rights. These rights differ according to the type of Creative Common license the material is placed in.

The four Creative Common licenses are:

Attribution (by)
Licensees may copy, distribute, display and perform the work and make derivative works based on it only if they give the author or licensor the credits in the manner specified by these.

Noncommercial (nc)
Licensees may copy, distribute, display, and perform the work and make derivative works based on it only for noncommercial purposes.
(If your Internet broadcast station has any form of advertising, either in the stream or on the station website, then you cannot use Creative Commons material released under this license.)

No Derivative Works (nd)
Licensees may copy, distribute, display and perform only verbatim copies of the work, not derivative works based on it.

ShareAlike (sa)
Licensees may distribute derivative works only under a license identical to the license that governs the original work.

www.creativecommons.org

Creative Commons search:
search.creativecommons.org

Creative Commons sound clips:
www.freesound.org
www.free-loops.com

Creative Commons music and independent musicians:
www.soundclick.com
www.artistserver.com
www.jamendo.com/en
www.tribeofnoise.com
freemusicarchive.org/curator/creative_commons
dig.ccmixter.org
www.mutopiaproject.org

Creative Commons and Public Domain video:
www.archive.org/details/feature_films

Webcasting Music Royalty Licensing

List of national agencies for various countries that are responsible for collecting music royalty fees for Internet broadcasting.

Country	Phonographic Rights Agency	Website Address
Australia	PPCA	www.ppca.com.au
Belgium	URADEX	www.uradex.be
Canada	NRCC / SCGDV	www.nrdv.ca
Denmark	GRAMEX	www.gramex.fi
Finland	GRAMEX	www.gramex.fi
France	ADAMI	www.adami.fr
Germany	GVL	www.gvl.de
Holland	SENA NORMA	www.sena.nl www.stichtingnorma.nl
Iceland	SHF	--
Ireland	RAAP	www.raap.ie
Italy	IMAIE	www.imaie.it
Japan	Geidankyo CPRA RIAJ	www.geidankyo.or.jp www.cpra.jp/web/e/activities.html www.riaj.or.jp/e/
Norway	GRAMO	www.gramo.no
Portugal	GDAIE	www.gdaie.pt
South Africa	--	--
Spain	AIE	www.aie.es
Sweden	SAMI	www.sami.se
Switzerland	SWISSPERFORM	www.swissperform.ch
UK	PPL	www.ppluk.com
USA	Sound Exchange (online only) AARC	www.soundexchange.com www.aarcroyalties.com

Companies that provide comprehensive solutions for the payment of Internet audio stream music licensing.

www.loudcity.net (USA)

www.swcast.net (USA)

www.webradioworld.com (Most countries other than United States.)

Multimedia Software

- Airtime
(Linux)
An open source radio software for scheduling, automation and remote station management.
sourcefabric.org/en/airtime

- Rivendell
(Linux)
An open source complete radio broadcast automation solution for the acquisition, management, scheduling and playout of audio content.
www.rivendellaudio.org

Rivendell Radio Automation Live CD installer for Ubuntu Linux.
rrabuntu.sourceforge.net

- ARAS
(Linux)
Radio automation system software.
aras.sourceforge.net

- AV Linux
(Linux)
Custom live CD for multimedia content creators that is based on on Debian/GNU Linux, which includes the following software:

- LXDE Lightweight X Desktop Environment
- Remastersys Tools
- linuxDSP Audio Plugins
- Ardour Digital Audio Workstation
- Hydrogen Drum Machine
- Rosegarden Audio/MIDI Score Editor
- Qtractor Audio/MIDI Sequencer
- Guitarix
- Openshot Video Editor
- LiVES Video Editor
- CinelerraCV Video Editor

www.bandshed.net/AVLinux.html

- Mixxx
(Linux)
An open source mixing software package for Djs.
www.mixxx.org

- Audacity
(Muliple platform)
An open source software for recording, editing and cleaning audio files.
audacity.sourceforge.net

- WebcamStudio
(Linux)
A GNU/Linux program that creates a virtual webcam that can mix several video sources together.
www.ws4gl.org

- Arista
(Linux)
An easy to use multimedia transcoder for the GNOME Desktop.
www.transcoder.org

- DeVeDe
(Linux)
An open source Linux program to create video DVDs and CDs (VCD, sVCD or CVD).
www.rastersoft.com/programas/devede.html

Additional Internet Broadcasting Guides

Internet Broadcasting Technical

Icecast Streaming Handbook
www.scribd.com/doc/18175026/Icecast-Streaming-Handbook

SHOUTcast Streaming Best of Technical Support
www.scribd.com/doc/24188933/SHOUTcast-Streaming-Best-of-Technical-Support

SHOUTcast Audio and Video Streaming Guide
www.scribd.com/doc/19781412/SHOUTcast-Audio-And-Video-Streaming-Guide

Basic Internet Video Production Guide
www.scribd.com/doc/41446946/Basic-Internet-Video-Production-Guide

Internet Broadcasting Help

Internet Broadcasters Guide For Creating An Effective Newsletter
www.scribd.com/doc/65355347/Internet-Broadcasters-Guide-For-Creating-An-Effective-Newsletter

Internet Broadcasters Guide For Creating An Effective Media Kit
www.scribd.com/doc/58758746/Internet-Broadcasters-Guide-For-Creating-An-Effective-Media-Kit

Internet Broadcasters Social Media Guide
www.scribd.com/doc/52674208/Internet-Broadcasters-Social-Media-Guide

Guide For Creating Effective Internet Audio Commercials
www.scribd.com/doc/49672496/Guide-For-Creating-Effective-Internet-Audio-Commercials

Internet Broadcast Revenue Handbook
www.scribd.com/doc/46694744/Internet-Broadcast-Revenue-Handbook

Internet Broadcast Promotion Handbook
www.scribd.com/doc/45171160/Internet-Broadcast-Promotion-Handbook

Additional Reading

www.radiostreamingnews.com

www.kurthanson.com

www.radiotoday.co.uk

www.radio-info.com

www.radiomagonline.com

www.radioink.com

www.broadcastingcable.com

www.fmqb.com

www.radiodailynews.com

www.radiosalescafe.com

www.allaccess.com

www.insideradio.com

www.multichannel.com

www.tvnewsinsider.com

www.adweek.com

www.rab.com

www.studiobriefing.net

www.internet.com

www.internetnews.com

www.emarketer.com

www.websitemagazine.com

www.iab.net

www.rinf.com

www.broadcastlawblog.com

Additional Resources

Open Source applications and software directory.
www.sourceforge.net

Daily news on the latest UNIX software releases.
www.freshmeat.net